REMARKS

This is in response to the non-final Office Action mailed October 28, 2010. Claims 1-26 are currently pending, of which claims 5, 6, 9, 10, 14, 15 and 16 are withdrawn. Claims 1, 3, 4, 11, 12, 13, 19, 20, 21, 24, and 26 are amended.

Reconsideration of the application is respectfully requested in view of the amendments and comments provided herein.

The Office Action

Claims 1-4, 7-8, 11-13, 17-19, and 20-26 are rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claims 1-4, 8, 11-13, 19, and 20-26 are rejected under 35 U.S.C. § 102(b) as being anticipated by U.S. Patent No. 5,362,836 to Helmer-Metzmann et al. (hereinafter "Helmer-Metzmann").

Claims 1-4, 7-8, 11-13, and 17-19 are rejected under 35 U.S.C. § 102(a) as being anticipated by WO 03/028139 to Devine et al. (hereinafter "Devine").

Claims 1-4, 7-8, 11-13, and 18-19 are rejected under 35 U.S.C. § 102(b) as being anticipated by WO 02/075835 to Andrews et al. (hereinafter "Andrews").

Claims 1-4, 7-8, 11-13, 17-19, and 20-23 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent No. 6,902,801 to Charnock et al. (hereinafter "Charnock").

Claims 1-4, 7-8, 11-13, 18-19, and 20-23 are rejected under 35 U.S.C. § 102(e) as being anticipated by U.S. Patent App. Pub. No. 2004/0224202 to Bridges et al. (hereinafter "Bridges").

Claims 1-4, 7-8, 11-13, and 18-19 are provisionally rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1, 8-10, and 12 of copending Application No. 11/602,186.

Claims 1-4, 7-8, 11-13, and 17-19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-2, 4-19 of U.S. Patent No. 7,799,465.

Claims 1-4, 7-8, 11-13, and 18-19 are rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claims 1-8 of U.S. Patent No. 7,303,830.

§112 Rejections

Claims 1-4, 7-8, 11-13, 17-19, and 20-26 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite. Specifically, the Examiner submits that claim 1 should recite "materials which includes moieties of formula A". Claim 1 has been amended to further place "A" in line 3.

With regard to claim 3, the Examiner submits that it is unclear if (i), (ii), and (iii) all have to be present or not. Applicant submits that claim 3 has been amended, removing (i) and (iii).

With regard to claim 4, Applicant submits that the moieties are clearly represented and labeled as (I), (II), and (III). Accordingly, the Examiner's contention that it is not clear what is meant by units (I), (II), and (III), is inappropriate. However, in an effort to further prosecution, Applicant has amended claim 4 to include I, II, and III after "a moiety of formula" as suggested by the Examiner. Moreover, the Examiner submits that the phrase "the phenyl moieties" lacks proper antecedent basis. However, Applicant submits that a person of ordinary skill in the art would recognize that each of moieties I, II, and III include phenyl moieties, so the definition within the chemical compounds named I, II, and III provides antecedent basis for the phenyl moieties. However, claim 4 has nonetheless been amended to remove "the" from the phrase "the phenyl moieties". Applicant submits that this correction further clarifies what is meant by "bonded via one or more of its phenyl moieties to adjacent moieties".

With regard to claims 11 and 12, the term "functionalized" has been replaced with the term "provided", which is similar to the wording of claim 1.

Claim 13 has been rejected as allegedly being unclear as to what is meant by "where substantially 100 mol% of moieties A are difuntionalised." Applicant respectfully submits that claim 13 is amended to replace the term "difunctionalised" with "disubstituted with groups which provide ion-exchange sites".

The Examiner contends that claim 19 cannot depend from claim 1, since claim 19 claims a ion conducting polymer and claim 1 claims a polymer electrolyte membrane that includes an ion conducting material. Claim 19 has been amended to be independent of claim 1.

Claim 20 has additionally been amended to be independent of claim 1.

Regarding claim 21, the Examiner submits that there is no antecedent basis for "said conditions for controllably sulphonating the polymeric material" because there is no method step of sulphonating with sulphuric acid. Claim 21 is now dependent upon claim 20, which provides

proper antecedent basis for the limitations in claim 21. Additionally, claims 22-26 are amended to depend, either directly or indirectly, from claim 21, which overcomes the Examiner's rejection.

Double Patenting

As a general point, the Office Action appears to have failed to take note that the moiety defined in claim 1 comprises the pendent groups –X-, which are **meta** to one another. It does not appear that the Examiner has acknowledged this at any point in the Office Action, which may indicate that the Examiner has overlooked this fact in assessing both the alleged double patenting and patentability.

With regard to the double patenting rejections, claims 1-4, 7-8, 11-13, and 18-19 are provisionally rejected for non-statutory obviousness-type double patenting over claims 1, 8-10, and 12 of co-pending Application No. 11/602,186. Applicant respectfully submits that claim 1 of 11/602,186 refers to a polymer electrolyte membrane which includes three units – a first unit, a second crystalline unit and a third amorphous unit. No further details are provided in claim 1 as to the nature of the units. It is submitted that the ion-conductive polymeric material specified in claims 1 and 19 of the present application, which includes a **specific** unit, with **meta**-arranged pendent X moieties, cannot be regarded as obvious over the general statement in claim 1 of 11/602,186. Claim 8 of 11/602,186 includes a number of far reaching general formulae (IV, V, IV*, V*), which describe an infinite number of possible copolymers. There is no specific reference to the moiety described in claims 1 and 19 of the present application. It would not be obvious for a skilled person to select the moiety described in claim 1 from the wide ranging generic structures of claim 8. Claim 9 specifies that the first unit described in claim 8 is sulphonated. However, this does not change the fact that claim 8 is directed to a wide ranging generic disclosure of copolymers and does not specify the **particular moiety** described in claim 1 of the present application. Therefore, claims 1 and 19 are not obvious over claim 9 of 11/602,186. Additionally, claim 10 of 11/602,186 refers to multi-phenylene or fused ring aromatic moieties. The moiety A described in claim 1 is neither of these, and therefore, claim 10 of 11/602,186 is not relevant to the patentability of claim 1 of the present application. Finally, claim 12 of 11/602,186 states that the second crystalline unit is of general formula IV or IV*. However, neither IV or IV* specifically disclose the moiety A described in claims 1 and 19 of

the present application. Therefore, it would not be obvious to modify the teaching of claim 12 and arrive at the subject matter of claim 1.

Second, claims 1-4, 7-8, 11-13, and 17-19 are rejected for non-statutory obviousness type double patenting over claims 1-2 and 4-19 of US 7,799,465. Claim 1 of US 7,799,465 includes repeat units I, II and III. None of those repeat units specifies a moiety "A" as recited in claim 1 of the present application and it would not be obvious to modify the teaching in claims 1 and 19 and arrive at the subject matter of the present invention. Moreover, claims 2 and 4-19, to which the Examiner refers, do not render claim 1, or any other claims of the present application, obvious. Whilst the Examiner refers particularly to claim 16 in referring to the equivalent weight, the relevance of this is not understood. The reference to equivalent weight in claim 16 does not render claims 1 and 19 obvious when the structure of the polymeric material is not taught.

Finally, claims 1-4, 7-8, 11-13, and 18-19 are rejected on the grounds of non-statutory obviousness-type double patenting over claims 1-8 of U.S. Patent No. 7,303,830. Applicant once again disagrees and submits that claim 1 of US 7,303,830 includes wide ranging generic formulae referring to moieties I, II and III which include an infinite number of possible copolymers. However, nowhere is a moiety specified which is equivalent to moiety A as per claim 1 of the present application, and therefore one skilled in the art would have no motivation to modify the moiety of 7,303,830 to the specific moiety A presently claimed. Accordingly, claim 1 of the present application is not obvious over claim 1 of US 7,303,830. The Examiner draws particular attention to the crystallinity described in US 7,303,830 and also draws attention to the fact that E and E' can be oxygen or sulphur atoms. However, nowhere in the claims of US 7,303,830 is a **meta** arranged moiety (equivalent to moiety A in the present application) disclosed. It would not be obvious to modify the teaching of US 7,303,830 and arrive at the subject matter of the claims of the present application.

It is therefore submitted that none of the applications/patents referred to by the Examiner include claims over which claims of the present application are obvious. It is respectfully submitted that the double patenting objections are inappropriate.

Anticipation Rejections

Claims 1-4, 8, 11-13, 19, and 20-26 stand rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,362,836 to Helmer-Metzmann. Specifically, the Examiner

submits that Helmer-Metzmann teaches polymer electrolytes comprising a sulfonated aromatic polyether ketone of the formula II, as presently claimed. Applicants respectfully traverse and submit that Helmer-Metzmann fails to teach or suggest the subject matter of the present claims.

The Examiner suggests that Helmer-Metzmann teaches "a sulphonated aromatic polyetherketone of formula II". However, Applicants submit that the homopolymer of formula II is provided at column 5, line 15 of Helmer-Metzmann, and it is clear from this that the –O-phenyl-O-moieties in the compound of formula II include **para**-substituted oxygen atoms, rather than the **meta**-substituted "X" atoms of moiety A required by claim 1 of the present application. It is submitted that claim 1 of the present application is clearly novel over Helmer-Metzmann. Furthermore, it would not be obvious to modify the teaching in Helmer-Metzmann and arrive at the subject matter of the present invention. Moreover, there is no suggestion to make such a modification.

In addition, as described in the present specification, the use of meta-substituted phenyl moieties of formula "A" in accordance with the present invention provides advantages over the prior art, both in terms of providing a means of controlling sulphonation and also in terms of the thermal stability (see example 14 in the present application).

Moreover, the Examiner's reference to sulphonation temperatures in Helmer-Metzmann and/or the time and/or the concentration of sulphuric acid are irrelevant, given that Helmer-Metzmann is treating a different material.

Claims 1-4, 7-8, 11-13, and 17-19 are rejected as being anticipated by WO 03/028139 to Devine. Applicant's respectfully traverses.

Particularly, Applicants note that, other than referring to claim 16, the Examiner does not refer to any specific passages in Devine which are alleged to anticipate the subject matter of the claims of the present application. Claim 1 of Devine describes a fuel cell comprising a repeat unit of Formula I along with a repeat unit of II or III. Applicants note that claim 1 does not specify **meta** linkages to the groups "X". It therefore clearly does not disclose the subject matter of claim 1. It is noted that page 7, lines 26 to 31 of Devine envisages monosulphonation of groups Ph^2 in the second unit which contrasts with the subject matter of claim 1 which specifies substitution with more than one group which provide ion-exchange sites.

Devine does not disclose moiety A as defined in claim 1, nor substitution with ion-exchange sites as described in claim 1. Rather, Devine includes a general disclosure of various

monomers, which may be used to produce an infinite number of polymers. There is no clear and unambiguous disclosure of the specific features described in claim 1. Applicant asserts that a generic formula that embraces a large number of species does not take away the novelty of a specific example which may fall within the general formula. (MPEP 2131.02). Claim 1 is therefore clearly novel over Devine. Furthermore, for the reasons discussed above with respect to Helmer-Metzmann, the present invention is not obvious over Devine.

Claims 1-4, 7-8, 11-13, and 18-19 are rejected as being anticipated by WO 02/075835 to Andrews. Specifically, the Examiner submits that Andrews claims a fuel cell comprising a polymer electrolyte membrane which includes a semi-crystalline polymer having a level of crystallinity of at least 0.5% and has a moiety of formula I and or formula II and or formula III, wherein E and E' can be O or sulphur atom. However, Applicant submits that Andrews is specifically directed to a semi-crystalline polymer having a moiety of formula I, and/or II, and/or III, but fails to provide any teaching or suggestion as to the specific disclosure of presently claimed moiety "A".

Similarly, the Office Action rejects claims 1-4, 7-8, 11-13, 17-19, and 20-23 as being anticipated by Charnock (US6902801). The Examiner makes specific reference to columns 25-26 of Charnock, which allegedly teach a composite membrane comprising an ion-conductive polymer having a moiety of formula I and/or formula II and or Formula III as presently claimed. Applicants respectfully traverse.

With regard to both Andrews and Charnock, although the references may generally encompass an ion-conductive polymer having moiety of formula I, and/or II, and or III, such a teaching includes an **infinite number of ion-conducting polymers** made of units I, II and III. **Nowhere** in Charnock or Andrews is there a specific disclosure of moiety "A" as described in accordance with independent claims 1, 19 and 20 of the present invention. Furthermore, nowhere in the disclosure is there disclosed substitution of a moiety "A" as defined in accordance with claim 1 of the present application. Accordingly, there is no specific disclosure of the invention described in claim 1. Moreover, Applicants note the Examiner draws attention to the definition of E and E'. However, nowhere within Charnock or Andrews is the **meta**-arranged moiety defined in claim 1 of the present application disclosed.

Moreover, the Examiner refers to column 30 of Charnock in relation to the equivalent weight. However, the relevance of this is not understood. An equivalent weight of 500 does not

mean that a disubstituted moiety of formula "A" as described in claim 1 is inevitably used. Numerous ion-conducting materials could have an equivalent weight of less than 500g/mol as defined in column 30 of Charnock.

The Examiner further refers to Example 6 in its reference back to examples 1-5 of Charnock. However, nowhere in any of the examples in Charnock is there described a moiety A as defined in the claims of the present application which includes **meta**-arranged pendent "X" moieties which are substituted on average with more than 1 and 3 or less groups which provide ion-exchange sites. Accordingly, it is submitted that claim 1 is clearly novel over Charnock.

The Office Action cites US2004/0224202 (Bridges) and asserts that Bridges anticipates claims of the present application. Applicants respectfully traverse.

The Examiner refers to column 15-16 of Bridges (which we take to mean pages 15 and 16). The Examiner points out that Bridges discloses a copolymer having the formula IV or V or IV* or V* where E and E' can be O or sulphur and Ar is selected from specified moieties. However, none of the moieties referred to by the Examiner is as specified in claim 1. Bridges includes a generic formula with many possible species, but no specific disclosure of the moiety of claim 1. Therefore the moieties described in Bridges do not anticipate claim 1.

The Examiner also refers to column 10-11 (which we take to mean pages 10 and 11) and example 7, referring back to Examples 1-6. Again, nowhere in the examples is there disclosed the moiety of formula A defined in claim 1 of the present application, substituted on average with more than 1 and 3 or less groups which provide ion-exchange sites. Thus, it is submitted that the claims of the present application define novel subject matter over the disclosure in Bridges.

As a general point therefore we submit that none of the prior art clearly and unambiguously describes the subject matter of the present invention. Furthermore, none of the prior art appreciates the advantages that result from the use of the moiety described in claim 1 of the present application which is substituted as described in claim 1. Furthermore, given that the prior art **does not specifically disclose** the moieties described in claim 1, it would not be obvious to modify any teaching in the prior art and arrive at the subject matter of claim 1 or any of the other claims in the application.

For at least the reasons described above, Applicant submits that the present claims distinguish patentably over the references of record. As such, withdrawal of the rejections and

allowance of the claims are respectfully requested.

CONCLUSION

For the reasons detailed above, it is respectfully submitted all claims remaining in the application (Claims 1-4, 7, 8, 11-13 and 17-26) are now in condition for allowance.

Respectfully submitted,

Fay Sharpe LLP

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Date

Scott A. McCollister, Reg. No. 33,961
Kimberly A. Textoris, Reg. No. 64,954
The Halle Building, 5th Floor
1228 Euclid Avenue
Cleveland, Ohio 44115-1843
216.363.9000

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